

WQGIT Recommendations for the Development of Phase III WIP Sediment Planning Targets

Background

The 2010 Chesapeake Bay Total Maximum Daily Load (Bay TMDL) was established to meet applicable water quality standards (WQS) in the Chesapeake Bay. Sediment loads are managed in the Bay TMDL to specifically address the water clarity/submerged aquatic vegetation (SAV) WQS. Excessive sediment fines (silts and clays) in the water column can reduce light to levels insufficient for SAV growth. The Bay TMDL's sediment allocations were established differently than those for nitrogen and phosphorus because of scientific and technical findings on the relative importance of nutrient loads compared to sediment loads in the impairment of SAV in tidal waters. As a result, the sediment targets developed for all phases of the Watershed Implementation Plans (WIPs) were formed on the basis of the sediment load delivered to the Bay associated with management actions taken to address nutrient planning targets.¹

Development of Sediment Planning Targets in the Phase I and II WIPs

In Phases I and II, the Chesapeake Bay Program (CBP) partnership found that a greater level of Best Management Practice (BMP) implementation was needed to meet the nutrient-based WQS, primarily for Deep Water and Deep Channel dissolved oxygen (DO), than was needed to meet the sediment-based water clarity/SAV WQS. This is because many of the BMPs implemented to achieve nutrient load targets, such as farm plans, cover crops, conservation tillage, and stream restoration, also remove considerable loads of sediment. In addition, we found that the water clarity/SAV WQS is generally more responsive to nutrient load reductions than it is to reduction of sediment loads. In Phase II, the CBP partnership estimated that full implementation of the Phase II WIPs would reduce the sediment loads to the Chesapeake Bay by about one third from 1985 loads, compared to a reduction of about one half for nitrogen and phosphorus over the same period.

Through the Bay TMDL, the CBP partnership agreed for the Phase I WIPs, and subsequently at a June 2011 WQGIT meeting for the Phase II WIPs, that the primary emphasis in the WIPs should be on nutrient reduction BMPs, which by their nature of reducing both nutrient and sediment loads in the watershed also achieve the water clarity/SAV WQS (Figure 1). This decision was further supported by research and findings in the Chesapeake (Gerbisz and Kemp, 2014; Lefcheck et al., 2018).² Accordingly, the Phase II WIP sediment targets were calculated using estimated sediment load delivered to the Bay resulting from the BMPs that the jurisdictions planned to implement to meet the Phase II WIP nutrient targets. An additional 10% allowance was added to the calculated sediment target in each major basin-jurisdiction to account for the overall model uncertainties in the calculation of the sediment targets, including uncertainties in the estimated sediment reductions of the BMPs and overall uncertainties in sediment fate and transport in watershed streams and rivers.

WQGIT Recommendations for Developing Phase III WIP Sediment Targets

1. Use the same approach that was used to develop the Phase II WIP sediment targets.

¹ It is important to note that while all lines of evidence point toward nutrients playing a larger role in SAV recovery, there are detrimental effects of sediment on the clarity/SAV WQS and state-level regulatory frameworks of the tidal CBP States address the issue of sediment's detrimental effects on water clarity and SAV.

² Sediment in the watershed is already the subject of thousands of local sediment TMDLs in streams and rivers being implemented by the Chesapeake Bay Program partners. There are also many streams impaired for sediment for which TMDLs are yet to be completed.

2. Phase III WIP sediment targets will be calculated depending on whether a jurisdiction exceeded or missed their Phase III WIP nutrient targets.
3. 2025 climate change conditions will be removed in calculating the Phase III WIP sediment targets for those jurisdictions addressing those climate reductions in their Phase III WIPs.
4. Phase III WIP sediment targets will be considered interim until 2022, consistent with the timeframe established for CBP partnership decisions on any further climate change reductions.
5. Conowingo WIP sediment target will be calculated using the same method as the Phase III WIP sediment targets for the jurisdictions.

The recommended approach for setting Phase III sediment targets is to follow the same process used in the Phase II WIPs. Specifically, initial Phase III WIP sediment targets will be calculated based on the jurisdictions' draft Phase III WIPs by quantifying the estimated sediment load delivered to the Chesapeake Bay using the Phase III WIP BMPs, including an additional 10% allowance. The final sediment targets will then be calculated after EPA receives the final Phase III WIPs and should then be appended to each jurisdiction's final Phase III WIP as interim targets until 2022. The Conowingo WIP sediment target will be developed following the same approach that was used for the jurisdictions' Phase III WIP sediment targets. The Phase III WIP sediment targets will be considered interim until 2022 when the CBP partnership makes decisions on any further reductions needed due to climate change. See Appendix A for more detailed information on this recommended process.

The draft Phase III WIP sediment targets as recommended by the WQGIT can be found in the table below. Note that tidal jurisdictions generally have an increase in their Phase III WIP sediment targets compared to the Phase II WIP sediment targets because of the inclusion of tidal shoreline sediment loads in the Phase 6 suite of CBP partnership modeling tools.

Jurisdiction & State-Basin	WQGIT Recommended Phase III WIP Sediment Target	Phase II WIP Sediment Target
District of Columbia		
Potomac	34	17
Delaware		
Eastern Shore	27	100
Maryland		
Eastern Shore	2,835	189
Patuxent	438	123
Potomac	1,880	731
Susquehanna	80	64
Western Shore	3,194	243
New York		
Susquehanna	464	304
Pennsylvania		
Eastern Shore	26	23
Potomac River	285	245
Susquehanna	1,752	1,677
Western Shore	0.35	0.31
Virginia		
Eastern Shore	288	15
James	2,214	966
Potomac	1,757	921

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Jurisdiction & State-Basin	WQGIT Recommended Phase III WIP Sediment Target	Phase II WIP Sediment Target
Rappahannock	1,300	1,197
York	739	153
West Virginia		
James	11	22
Potomac	591	351
Total Phase III WIP Sediment Target	17,915	7,341

*Units in million pounds per year

Proposed Schedule

1. July 11, 2019 – Management Board review of June 10 WQGIT recommendations.
2. August 12, 2019 – PSC conference call to approve draft interim Phase III sediment targets.
3. August 2019 – Final Phase III WIPs submitted by jurisdictions incorporating draft interim Phase III WIP sediment targets.
4. Early September – Final interim Phase III WIP sediment targets sent to the WQGIT for review and approval.
5. Late September – PSC meeting/call to approve final interim Phase III WIP sediment targets.
6. Mid-October – Final interim Phase III WIP sediment targets released by the CBP partnership and added by each jurisdiction to its final Phase III WIP as an addendum.
7. 2021 – 2022 – Revise interim Phase III WIP sediment targets based on CBP partnership decisions on 2025 climate change conditions.

Appendix A: Additional Information on WQGIT Recommended Process for Developing the Phase III WIP Sediment Targets

Figure 2 is an example of the calculation of the draft Phase III WIP sediment targets. Assume a jurisdiction's state-basin nutrient targets of a hypothetical 50 million pounds of nitrogen and 5 million pounds of phosphorus has been achieved by its Phase III WIP. Using the Phase III WIP BMPs to calculate the associated pounds of sediment results in an estimated 1 million pounds of sediment delivered to the tidal Bay. Then a 10% allowance is applied to the Phase III WIP sediment target, which in this hypothetical case would be 100,000 pounds of sediment. Therefore, the total Phase III WIP sediment target would be an estimated 1.1 million pounds.

Example: Basin Jurisdiction Achieved Nutrient Targets

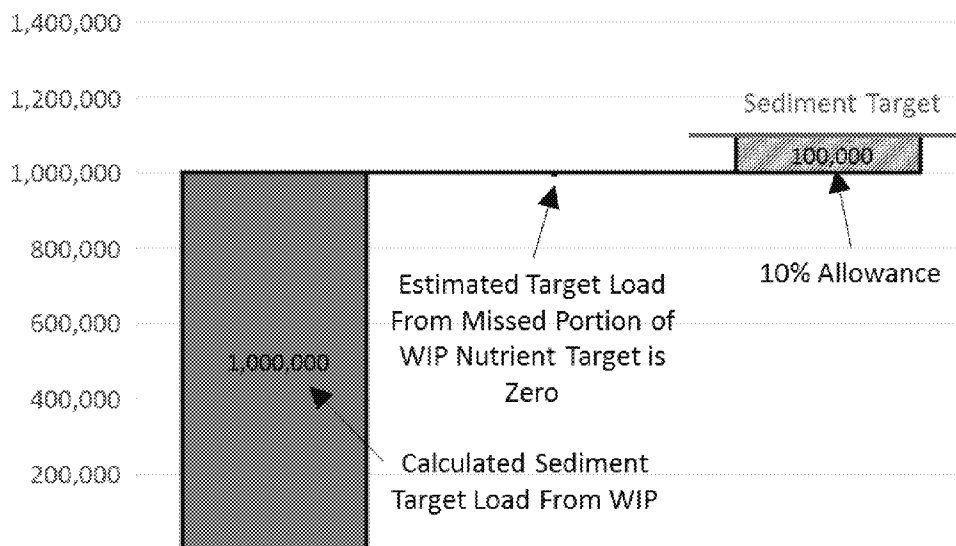


Figure 2. Estimated draft sediment target with 10% allowance when nutrient target is fully achieved. The solid blue is the portion of the sediment target calculated from the sediment delivered to tidal waters from the Phase III WIP BMPs and the striped blue bar is the 10% allowance. Units in pounds.

However, use of this approach depends on the jurisdictions' meeting their respective Phase III WIP state-basin targets for nutrients. If a jurisdiction fails to meet the nutrient targets, an adjustment to the sediment target load delivered to the tidal Chesapeake would be calculated based on the proportion of the missed nutrient load target. In all cases an additional 10% would be added to the calculated sediment target in each major state-basin- to allow for flexibility in implementation.

In an example using the same hypothetical partner's state-basin-, but in this case only 75% of their Phase III WIP nutrient targets of 50 million pounds of nitrogen and 5 million pounds of phosphorus was achieved, the calculated pounds of sediment delivered to the Bay would be higher than the former case at 1,250,000 pounds because less BMPs in the watershed are allowing more sediment to be transported to the Bay (Figure 3).³

³ Using the missing portion (25%) of the nutrient target to estimate the remaining portion of the sediment target that would not have been delivered to the Bay if the nutrient target was met results in 250,000 pounds of sediment removed from the estimated sediment loads delivered to the Bay from the underperforming WIP. The 1,250,000 pounds of reduced sediment load to the tidal Bay estimated from the underperforming WIP and the estimated 250,000 pounds removed from the sediment target because of the missed nutrient target are summed for an estimated 1 million pounds (1,000,000 pounds) of sediment

Example: Basin Jurisdiction Missed Nutrient Targets

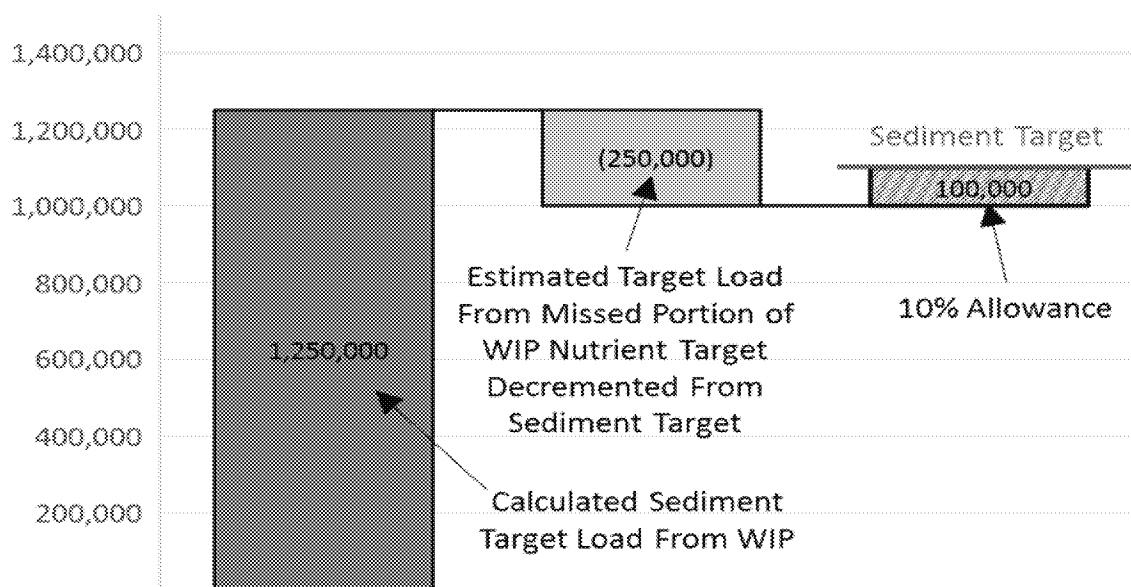


Figure 3. Estimated draft sediment target with 10% allowance under the hypothetical case of achieving only 75% of the nutrient target. The solid blue is the sediment target (delivered to tidal waters) calculated from the management practices in the draft Phase III WIP, the solid green bar is the portion of the decreased sediment loads delivered to the Bay based on the missed portion of the nutrient target, and the striped blue bar is the 10% allowance. Units in pounds.

An additional issue is a jurisdiction taking additional nutrient reductions beyond the Phase III WIP planning targets to ensure attainment of WQSs despite future climate risk. The PSC has directed in their December 20, 2017 and March 3, 2018 meetings that jurisdictions account for additional nutrient and sediment pollutant loads due to 2025 climate change conditions in a Phase III WIP addendum and/or 2-year milestones beginning in 2022. Bay jurisdictions may have voluntarily addressed the estimated nutrient reductions for 2025 climate change conditions in their Phase III WIPs, but others may have simply addressed this issue narratively. This creates a potential imbalance in the development of the draft Phase III WIP sediment targets.

Therefore, the recommended approach is to remove any additional nutrient reductions over and above the Phase III WIP targets due to 2025 climate change conditions so that all the Phase III WIPs have the same starting point for their sediment targets. As previously described, the sediment targets are interim targets that would be reopened as needed in 2022, pending CBP partnership decisions on further reductions needed to account for 2025 climate change conditions.

An example of partner's basin-jurisdiction exceeding the nutrient target in order to address future climate risk or growth is shown in Figure 4. In this case 125% of the nitrogen and phosphorus target was achieved, and the calculated pounds of sediment delivered to the Bay is lower than the case of

removed from the tidal Bay. Then with the 10% allowance again applied, the sediment target allowance in this hypothetical case would be 100,000 pounds of sediment. Adding the calculated sediment load delivered to the Bay under the Phase III WIP and the 10% allowance results again in a calculated 1.1 million pound sediment target (1,100,000 pounds) for the hypothetical basin jurisdiction.

achieving the nutrient targets shown in Figure 2. When there is an overshoot of the nutrient Phase III target the sediment target is too low because more BMPs in the watershed are allowing less sediment to be transported to the Bay. Using the overshoot portion (25%) of the nutrient target to estimate the remaining portion of the sediment target that would have been delivered to the Bay if the nutrient target was exactly met results in 250,000 pounds of sediment added to the estimated sediment target loads delivered to the Bay from the overperforming WIP.⁴

Example: Basin Jurisdiction Exceeded Nutrient Targets

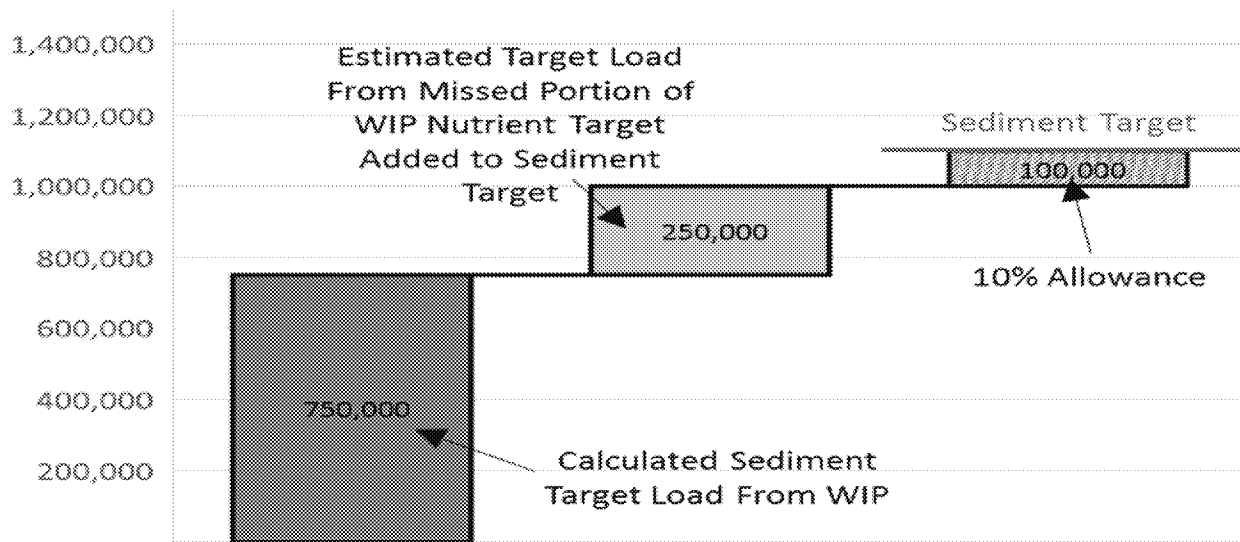


Figure 4. Estimated draft sediment target with 10% allowance under the hypothetical case of overshooting the nutrient target by 125%. The solid blue is the sediment target (delivered to tidal waters) calculated from the sediment reductions of the management practices in the draft Phase III WIP, the solid green bar is the portion of the increased sediment loads delivered to the Bay estimated by the overshoot portion of the nutrient target, and the striped blue bar is the 10% allowance. Units in pounds.

In all cases (Figures 2-4) the estimated sediment target is the same regardless of meeting, undershooting, or overshooting the Phase III nutrient targets.

A final issue for the Phase III WIP sediment targets is the Conowingo WIP, which will be finalized after the final Phase III WIPs. In this case, the Conowingo WIP sediment target would be developed by the process described above, once the BMPs are identified in the final Conowingo WIP.

⁴ The 750,000 pounds of reduced sediment load to the tidal Bay estimated from the overperforming WIP and the estimated 250,000 pounds added to the sediment target because of the overshoot nutrient target are summed for an estimated 1 million pounds (1,000,000 pounds) of sediment removed from the tidal Bay. Then with the 10% allowance again applied, the sediment target allowance in this hypothetical case would again be 100,000 pounds of sediment. Adding the calculated reduction from BMPs and the 10% allowance results again in a calculated 1.1 million pound sediment target (1,100,000 pounds) for the hypothetical basin jurisdiction.

References

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"https://www.chesapeakebay.net/channel_files/26045/additional_nutrient_reductions_from_assessment_of_bay_assimilative_capacity_and_atmos_deposition_march_2_2018_psc_mtg_briefing_paper.pdf"] and Kemp, 2014. Unexpected resurgence of a large submersed plant bed in Chesapeake Bay: Analysis of time series data. *Limnology and Oceanography*, 59(2), 2014, 482–494.

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*Awarded the National Academy of Science Cozzarelli Prize.